LUCAS COUNTY ENGINEER'S OFFICE

CAD STANDARDS

Sequential Guidelines for Generating Plan and Profile Sheets Using the UCS Coordinate System Environment and the Model Space / Paper Space Environment

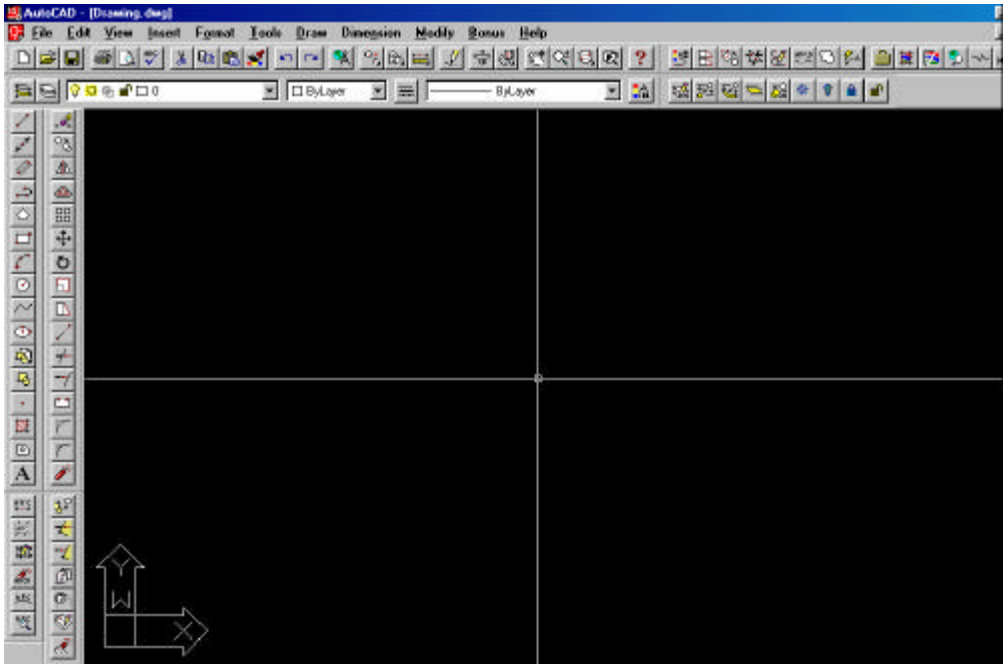
<u>Section 1 – The Model Space / Paper Space Analogy</u>

The Model Space / Paper Space analogy is a relatively easy concept to understand. Think of model space as a "painting" or "portrait" of your project's existing topography, existing profile(s) and design. All being kept in one drawing, one environment. No more multiple plan and profile sheet

drawings to keep track of. The only other drawings in your project directory would be your title sheet, general notes, cross sections and details. Now think of paper space as the "matte" by which you overlay your "painting/portrait" with. Then in paper space, you would selectively "cut" windows in your matte and reveal underneath the topography, profile(s) and design in your model space. It would also be there, in paper space, that you would insert the standard plan, or plan and profile sheets. Pretty simple.

Section 2 – UCS World and User Defined Coordinate Environments

The UCS environment is a key element in the development of your project. When the original survey data was collected out in the field, the coordinate base was defined by the field crew, either by their own starting coordinates or maintained from a previous survey. In either case, when you generate the project's topo, it will be generated in what is known as the "World Coordinate System". This is the coordinate base by which all initial surveys are defined (the double-headed arrow in the lower left hand corner of your AutoCAD screen indicates which coordinate system you are in, "W" indicating the "World Coordinate System"):



Now, since multiple user defined coordinate systems can be created in one drawing, no manipulation of the topo that's in the world coordinate base is required. In other words, you will not have to move or rotate your entire survey for it to be in a 0 degree declination, especially if the survey was taken in any other direction besides west to east or east to west. This will clearly

eliminate any possibility of losing your original coordinate base or any elevations associated with any elements in your drawing.

Section 3 – Effective Reasons for Using Model Space / Paper Space / UCS

The most effective reasons for using the Model Space / Paper Space features in AutoCAD are quite clear:

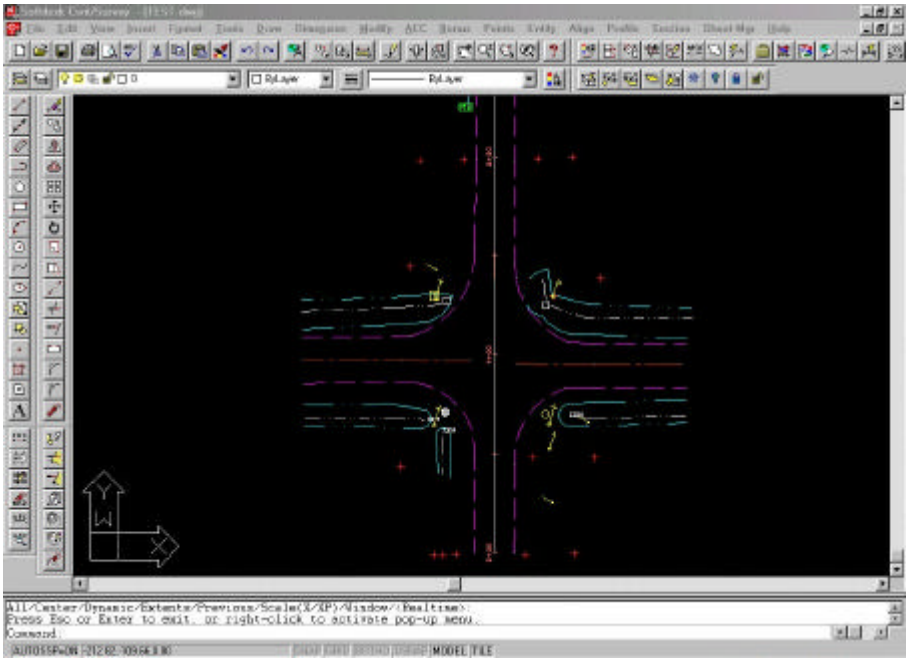
1. **Maintaining your overall project in one (1) drawing.**
2. **Not having to "break up" topo for individual drawings.**
3. **Guaranteeing layer, linetype and color consistency for all plan/profile sheets.**
4. **Guaranteeing design consistency throughout project.**
5. **Probably, the most important, it saves time and adds to your effectiveness as a productive CADD Technician.**

The most effective reasons for using User-defined UCS coordinates in AutoCAD are also clear:

1. **There is no possibility of losing the original coordinate base or original elevations due to the incorrect manipulation of topo and data.**
2. **User-defined UCS's can be modified and recreated for any purpose.**
3. **Again, the most important, it saves time and data and adds to your effectiveness as a productive CADD Technician.**

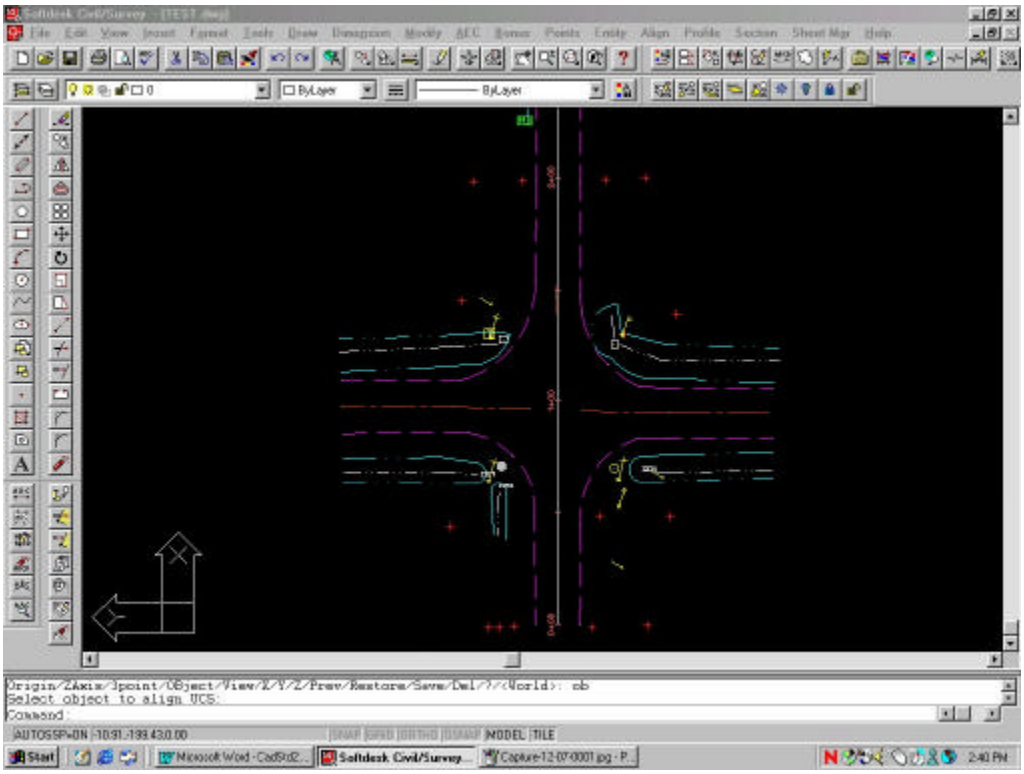
Section 4 – Working with Topography in UCS and Model Space

Once you have generated your existing topo and your alignment control, you'll want to set up a new UCS, (unless your survey runs east to west or west to east), to work more effectively with the Paper Space environment. To accomplish this, do the following. Zoom Window into an area that displays your

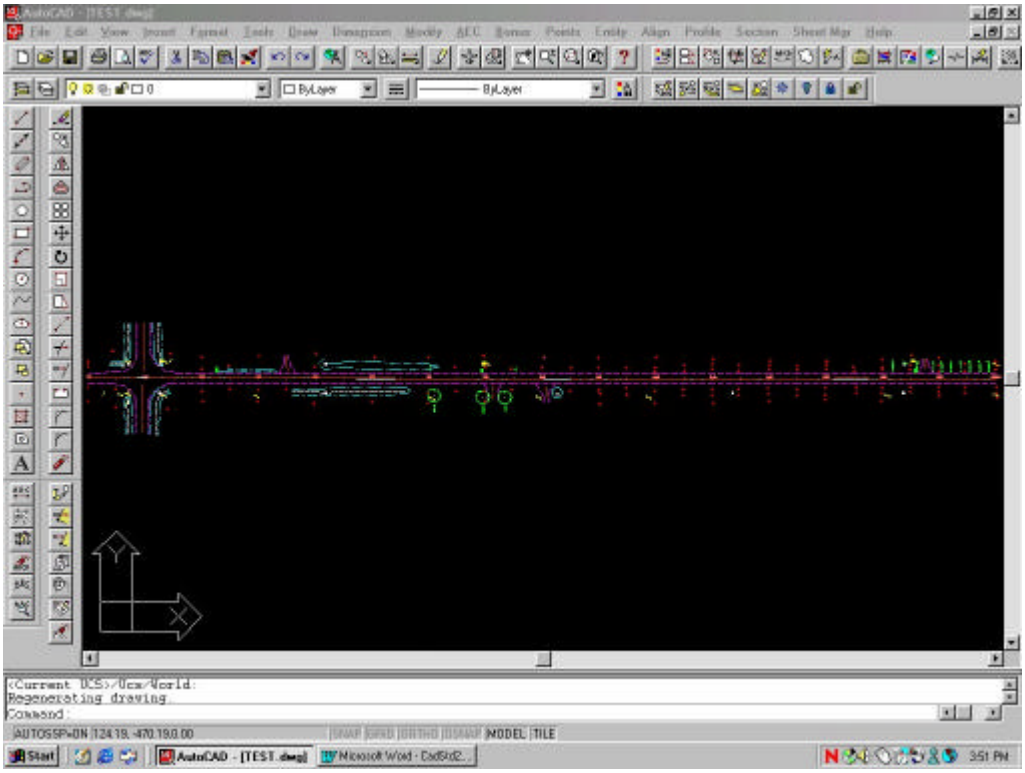


alignment better:

Now, type in “ucs” and enter. Then “ob”, enter, because you will base your new UCS on an object you are going to select, which, of course, will be your alignment. You should now be ready to select your alignment. Remember, AutoCAD remembers how your alignment was created, so if it was drawn from the north end of your project to the south end of your project, you may have to draw a temporary line in your drawing from the south end to the north to use as your selection object to orient your new UCS. Now, either, select your alignment or create a temporary line and select it. As soon as you select it, the double-headed arrows should have rotated to the new orientation:



You are now ready to reorient your view so that the plan is in the "0 Degree" declination. Type in "plan" and enter twice. Your new view should look like this:

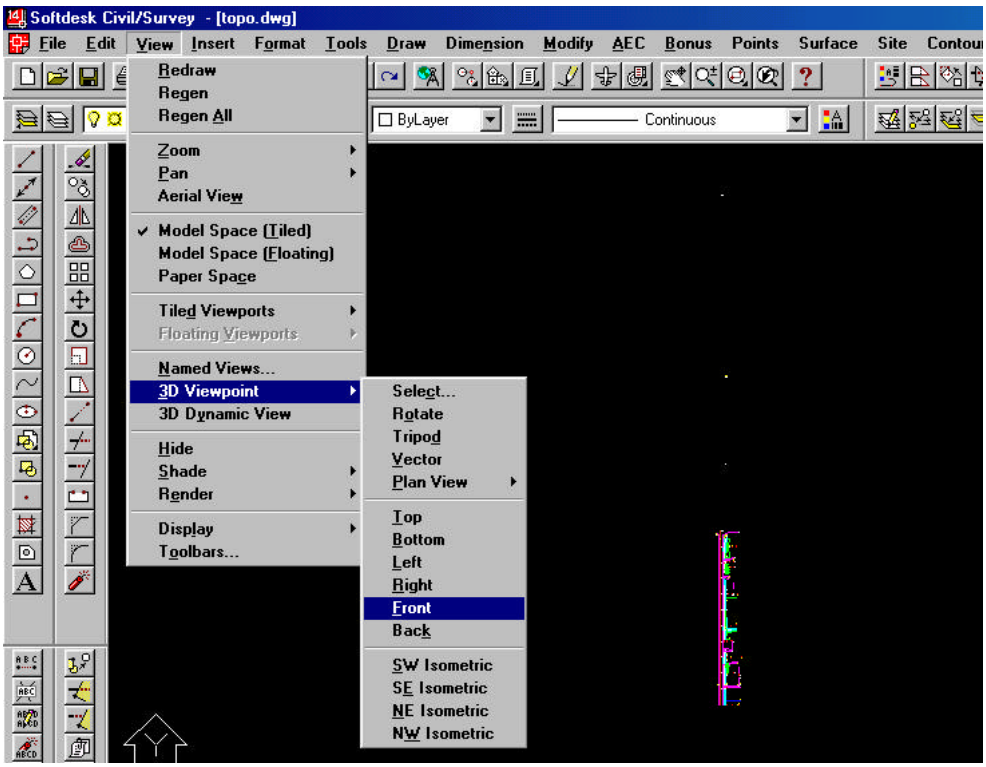


It's time to save your new plan view as your new UCS Coordinate System. Type in "ucs", enter. Then, "s" for save, enter. You may use any saved UCS name you want, but just to keep things simple, use "plan" for now. Your current USC is now saved as "plan". <u>PLEASE NOTE: IF YOU WANT TO DO ANY SOFTDESK OPERATIONS, YOU WILL HAVE TO SWITCH THE UCS BACK TO "WORLD" FIRST. DO THIS BY TYPING "UCS" AND HIT ENTER TWICE. THIS WILL NOT REORIENT THE VIEW, BUT YOU WILL NOTICE THE DOUBLE-HEADED ARROWS ROTATE BACK TO "WORLD". AFTER YOU COMPLETE THE SOFTDESK OPERATION, SIMPLY TYPE "USC" AGAIN, ENTER, TYPE "R" FOR RESTORE, ENTER AND THE ARROWS RETURN TO YOUR NEW PLAN ORIENTATION.</u> Remember, if your survey was taken west to east or east to west, you will not have to go through this process.

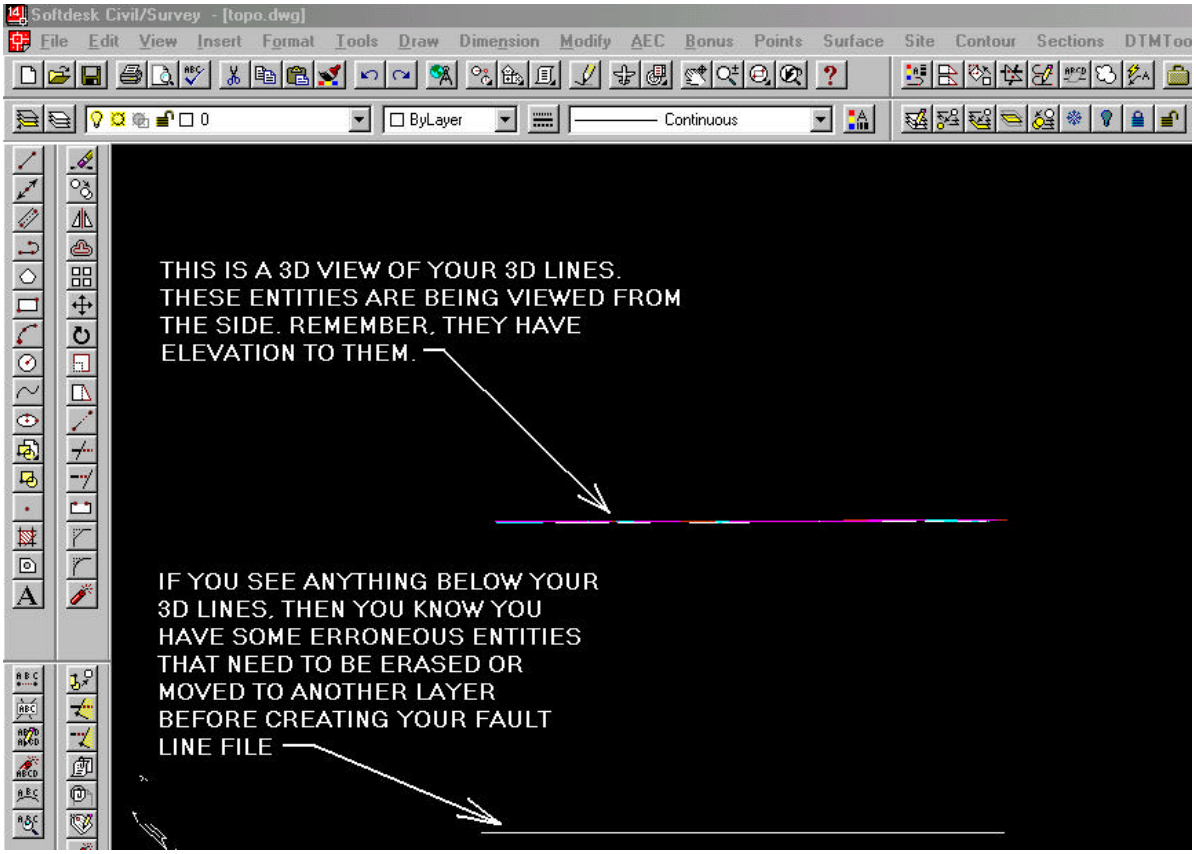
Section 5 – Working with Profiles in UCS and Model Space

Now you are ready to create a profile in model space in the same orientation as your new UCS. We'll use the baseline as our profile centerline. So, go ahead and generate a tin, then set up your profile settings and cut your profile, then comeback and pick up from this point. Please check your 3d lines that you will use for making your fault lines with. To do this, do the following:

Freeze all the layers except the layers that have the 3d lines (fault lines) on them. Then go to the view pull down and click the highlighted commands:

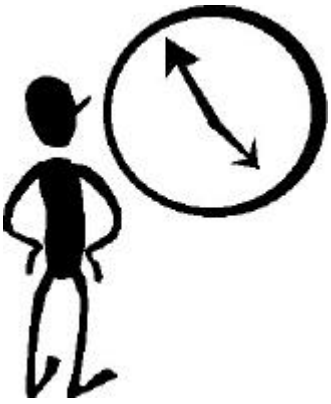


Depending on your survey orientation, you should select "front" for west to east surveys and "right" or "left" for south to north surveys. Now you should have something like this:



To get back to your plan view, just select the view pull down and from the 3d viewpoint, select "top".

Remember to switch your UCS back to "World", then when you're ready to import your profile, switch your UCS back to your plan view and return here. Also, be sure to align your plan stationing with your profile stationing. See you in a bit. I'll wait here….

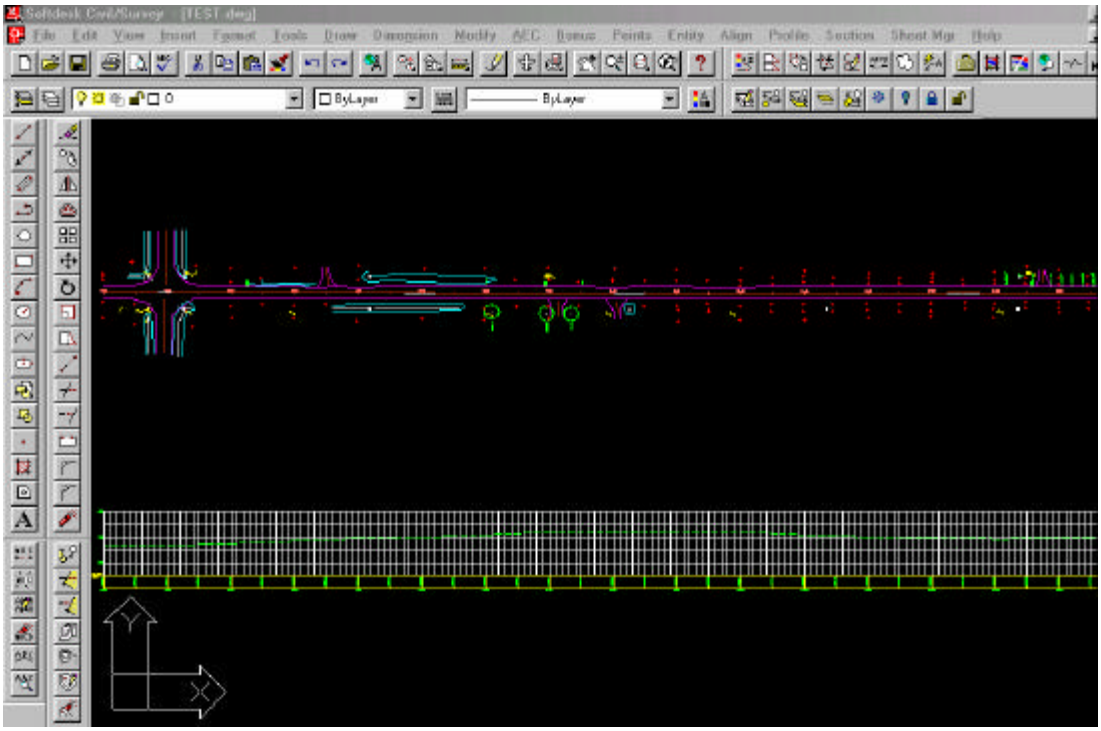


All done?

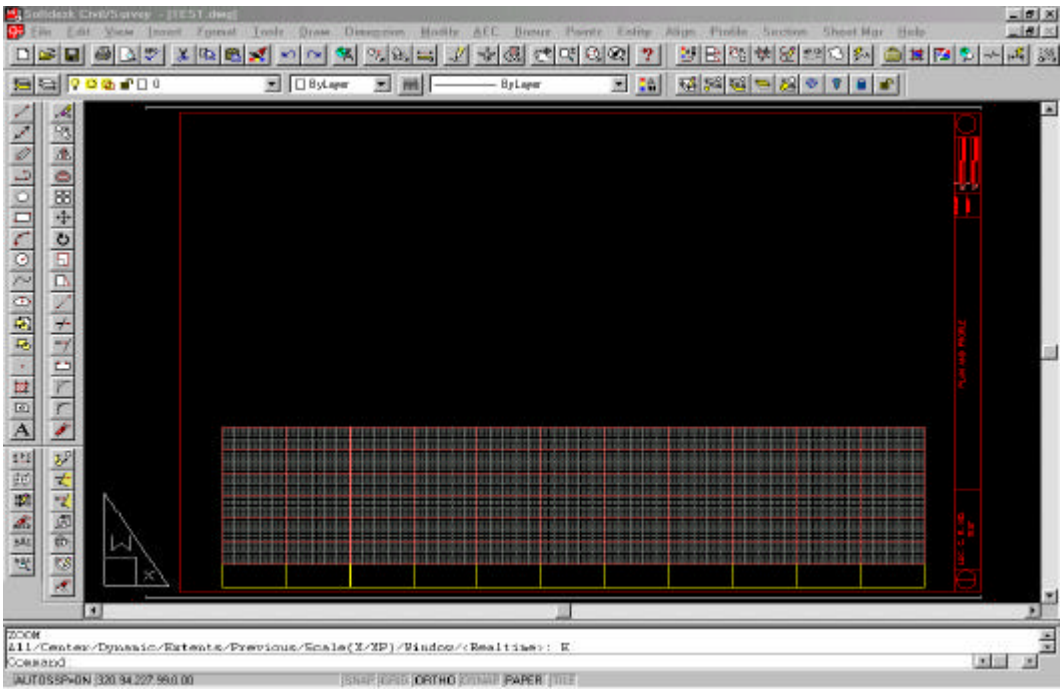
Now that you have your existing profile in your drawing and in the correct orientation with your plan, you're ready to go to the next phase of the process…creating your plan and profiles in Paper Space.

Section 6 – Working With Plan and Profile Sheets in Paper Space

Now you should have something that looks like this:

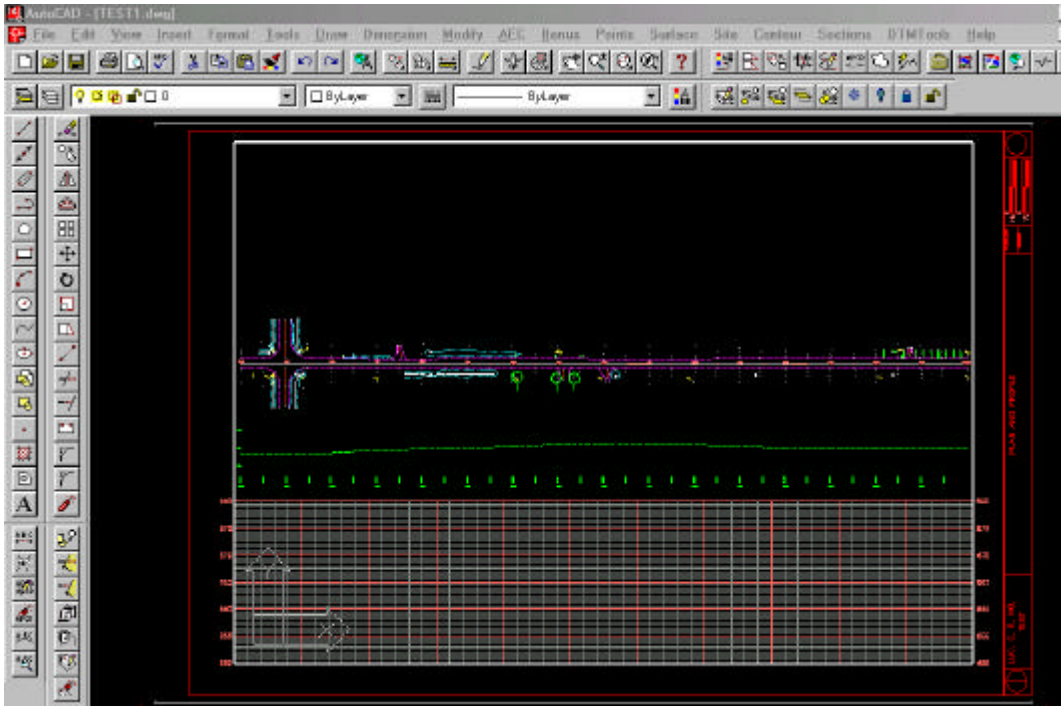


The next step is to switch to the Paper Space environment. Just double-click on the "Tile" button at



the bottom of the AutoCAD screen. Your screen should now be blank. Now insert a County Standard Plan and Profile sheet, using 0,0 as your insertion point and use 20 scale:

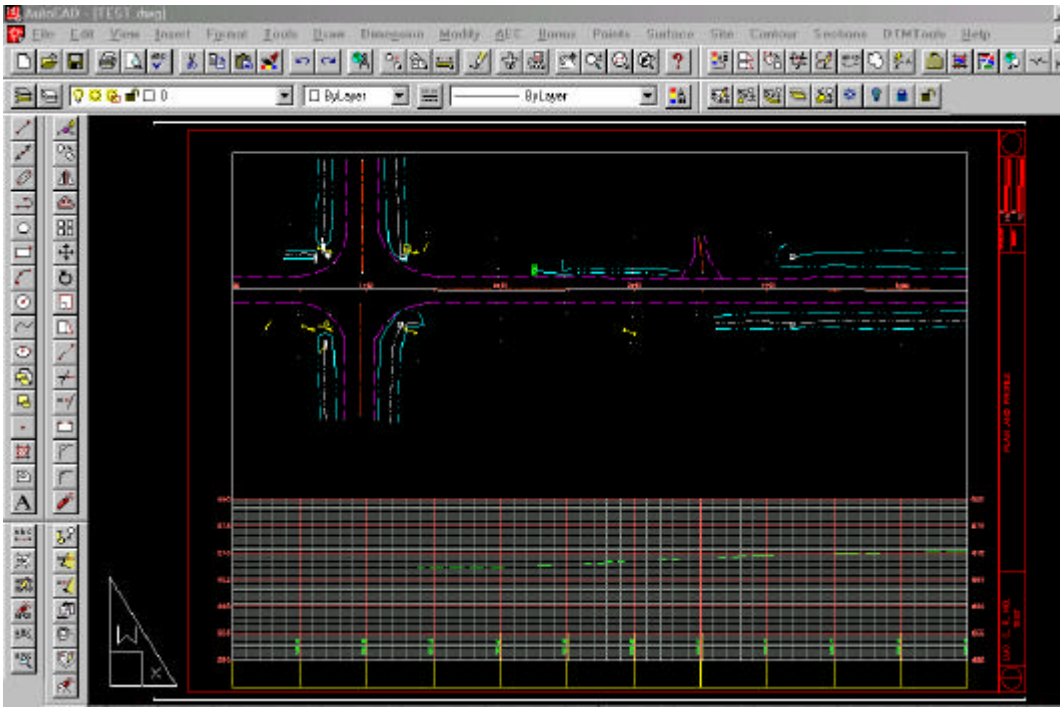
There are two methods by which you can create an mview for your plan and profile sheet. For the first, make sure that you place the profile close enough to the plan, because, in the first method you'll be creating an mview that will cover both the plan and profile. In the second, you'll create two separate mviews, one for the plan and one for the profile. The reason for this is, that if any intersection in your plan, in addition to your profile, is larger than 400 units in width, both will not fit in one mview. Now onto the first method. At the command prompt, type in "mview". Now pick the lower left endpoint of the profile grid, then pick a point in the upper right area of the plan, close to the border sheet edge line. You should have something like this:



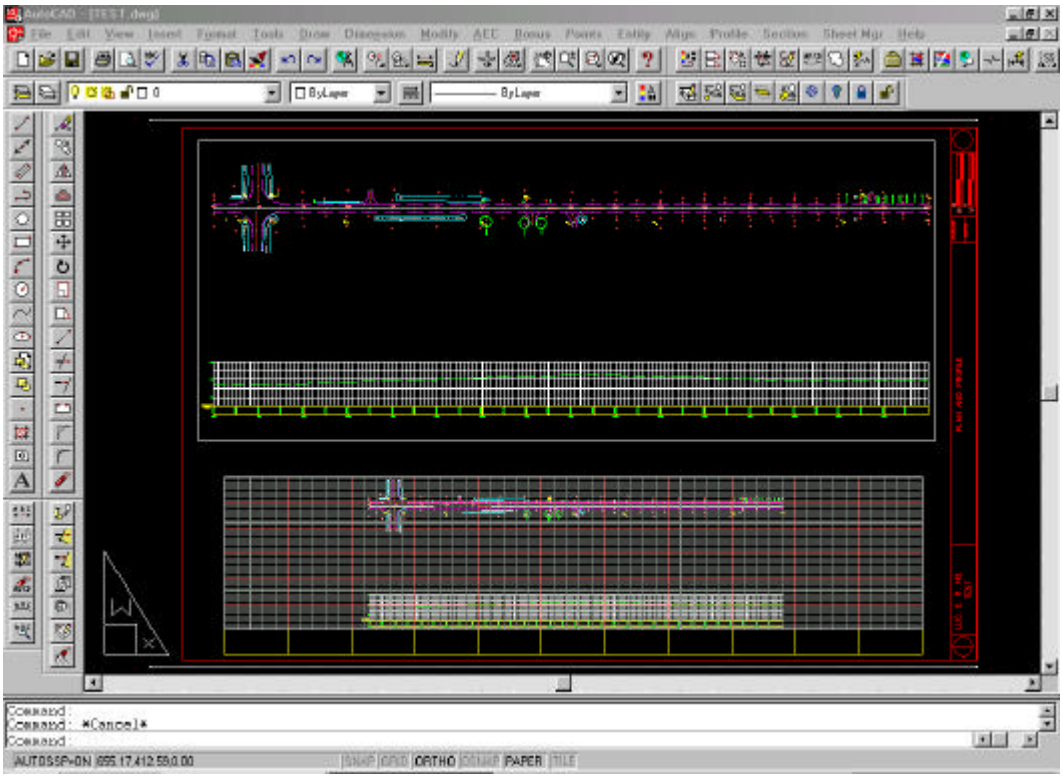
The next step is to adjust the zoom window scale. Double click the "Paper" button at the bottom of the screen. Your crosshairs should appear inside the mview window. Now, type in zoom and then 1xp. Hit enter. Then it's just a matter of lining up the profile grid with the grid that's part of your plan and profile sheet.

Now, you should have something that looks like this:

(Use this same process for the proceeding sheets.)

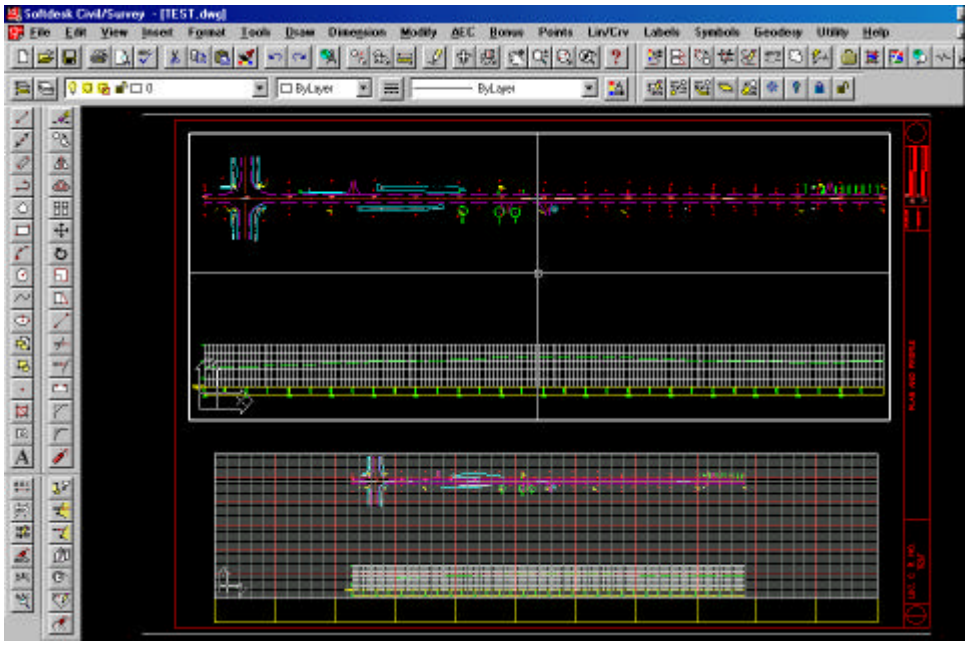


If your plan is too large to allow one mview to cover both plan and profile, you'll need to create two views. One for your plan and one for your profile. Go back to the point where you're going to create the first mview. Type in "mview", hit enter, then select two points up in your plan area. Next, do the

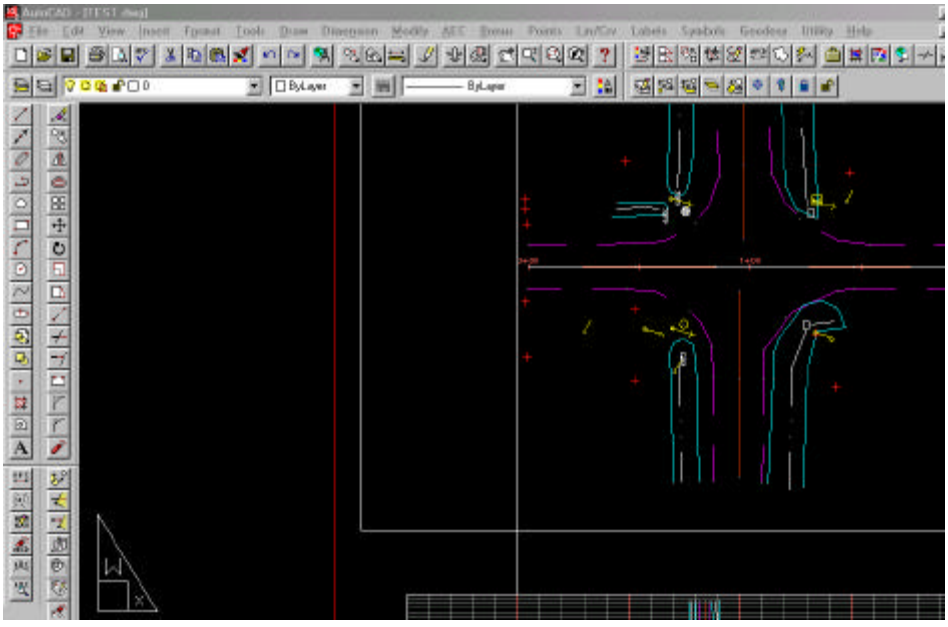


same for your profile area, use the sheet grid. Now you should have something like this:

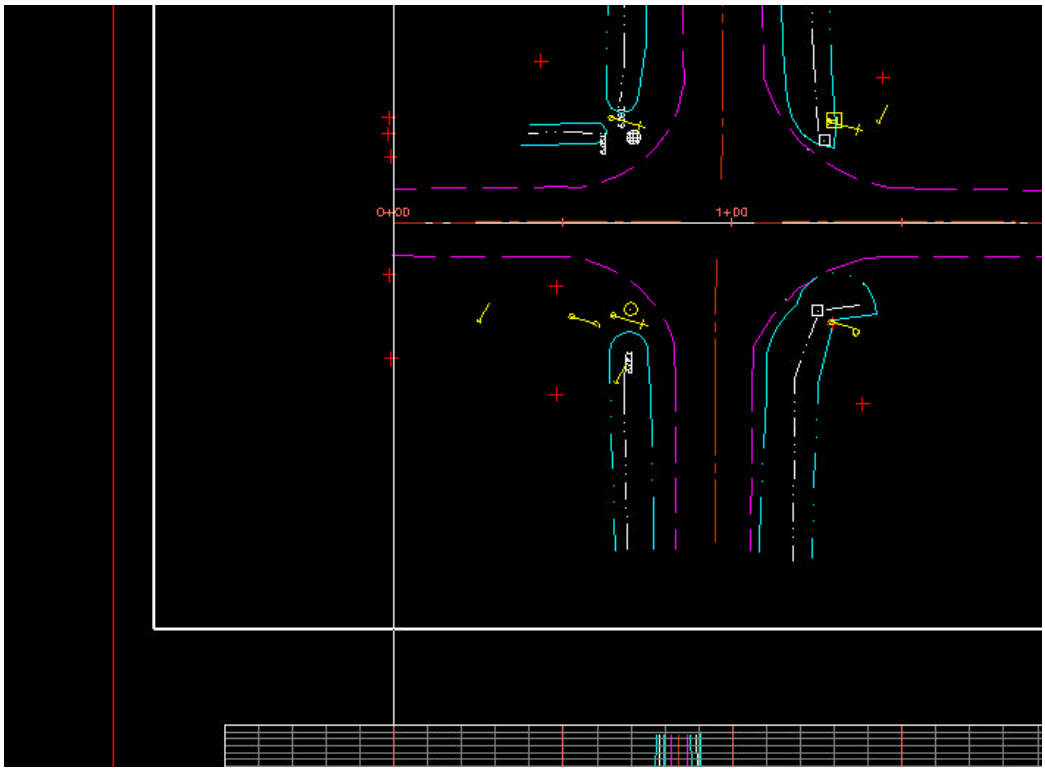
Your next step is to adjust the zoom windows scale for each mview. To do this, click in the plan area first. Next, double-click the "PAPER" toggle button at the bottom of the AutoCAD screen. You'll notice the crosshairs appear inside that window. Congratulations, you have just successfully toggled between the Paper space environment and the Model Space environment. You should have something like this:



You'll want to set your "Zoom Window" factor to the correct viewing scale inside the mview window. Type in "Z" or "Zoom" and hit enter. Then type the number one (1) and xp and hit enter.
Now, toggle back. The next thing you'll want to do is draw a line from your profile, at the intersecting location of your beginning station, up through your plan:



Now toggle back to Model Space and "Pan" your plan view over to match up your stationing with the line you drew:



Now toggle back, zoom out and repeat the same steps for your profile view, except you won't have to draw a line to line up this view and the "xp" value for the profile mview will be 20. The reason you won't draw the line to line up the profile is you have the grid of the profile and the grid of the plan and profile sheet to use as references to each other. Now you should have something that looks like this and now you are ready to create your next sheet in this same drawing (repeat for other sheets):